



Alzheimer disease

Name: Ahmed Elsayed Elsayed Ebrahim

Under the supervision: Prof. Eman Said Abd-El Khalek

Dr. Mahmoud Samaha

Introduction:

Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills, and eventually, the ability to carry out the simplest tasks. In most people with Alzheimer's, symptoms first appear later in life. Estimates vary, but experts suggest that more than 6 million Americans, most of them age 65 or older, may have Alzheimer's

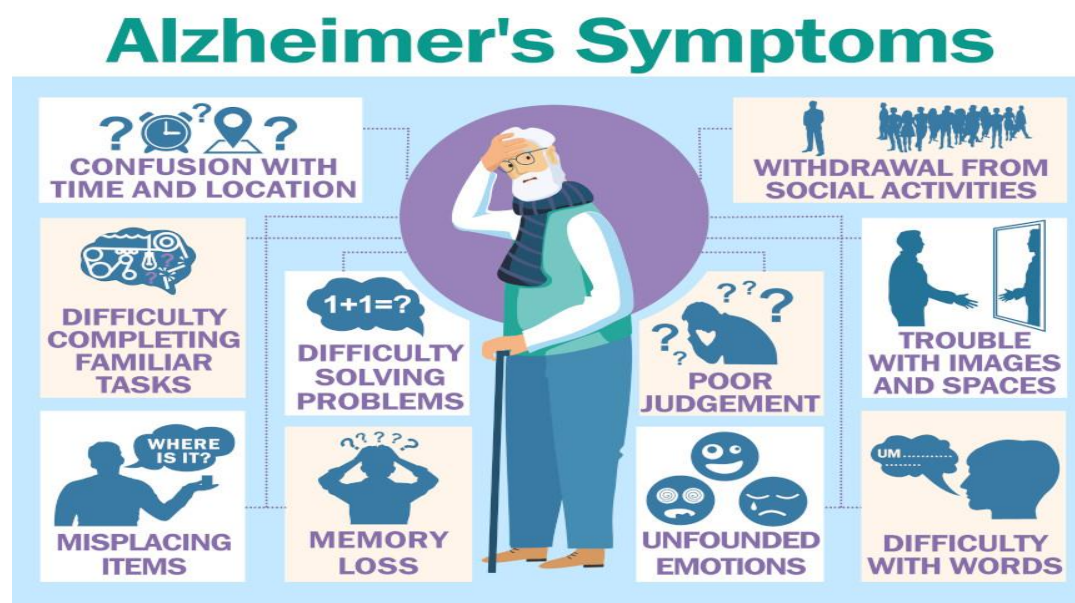


Signs and symptoms of Alzheimer's disease:

Memory problems are typically one of the first signs of cognitive impairment related to Alzheimer's. Some people with memory problems have a condition called mild cognitive impairment (MCI). With MCI, people have more memory problems than normal for their age, but their symptoms do not interfere with their everyday lives. Movement difficulties and problems with the sense of smell have

also been linked to MCI. Older people with MCI are at greater risk for developing Alzheimer's, but not all of them do so. Some may even revert to normal cognition.

The first symptoms of Alzheimer's vary from person to person. For many, decline in nonmemory aspects of cognition, such as word finding, vision/spatial issues, and impaired reasoning or judgment may signal the very early stages of the disease. Researchers are studying biomarkers (biological signs of disease found in brain images, cerebrospinal fluid, and blood) to detect early changes in the brains of people with MCI and in cognitively normal people who may be at greater risk for Alzheimer's. More research is needed before these techniques can be used broadly and routinely to diagnose Alzheimer's in a health care provider's office.



Stages of Alzheimer's disease

Mild Alzheimer's disease

As Alzheimer's worsens, people experience greater memory loss and other cognitive difficulties. Problems can include wandering and getting lost, trouble

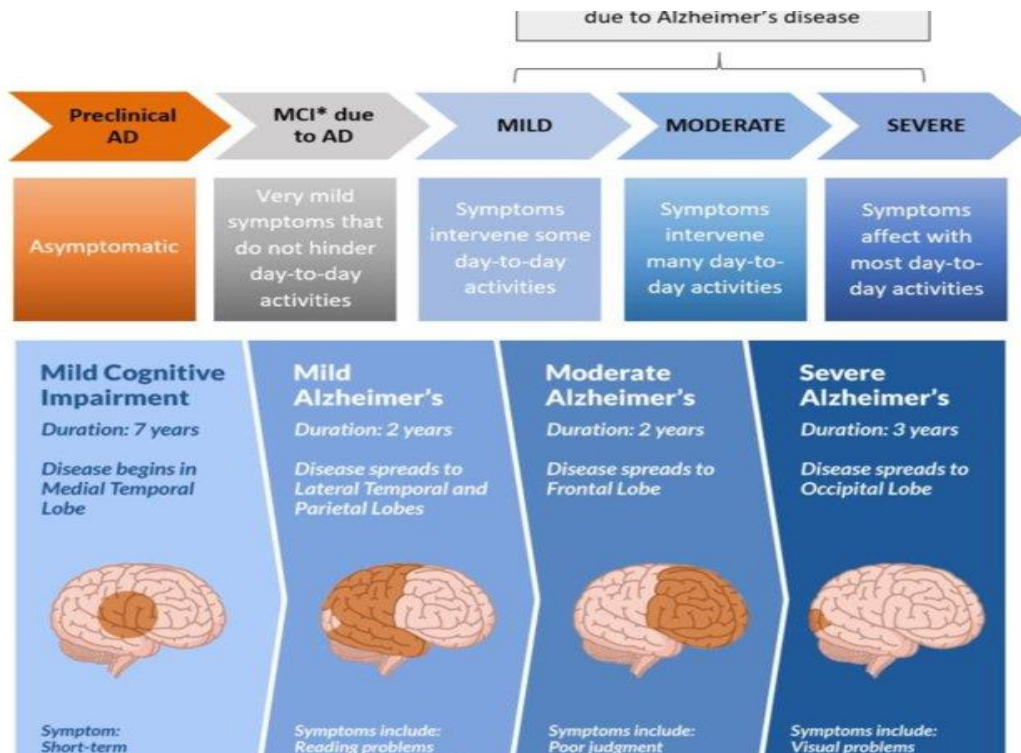
handling money and paying bills, repeating questions, taking longer to complete normal daily tasks, and personality and behavior changes. People are often diagnosed in this stage.

Moderate Alzheimer's disease

In this stage, damage occurs in areas of the brain that control language, reasoning, conscious thought, and sensory processing, such as the ability to correctly detect sounds and smells. Memory loss and confusion grow worse, and people begin to have problems recognizing family and friends. They may be unable to learn new things, carry out multistep tasks such as getting dressed, or cope with new situations. In addition, people at this stage may hallucinate, delusions, and paranoia and may behave impulsively.

Severe Alzheimer's disease

Ultimately, plaques and tangles spread throughout the brain, and brain tissue shrinks significantly. People with severe Alzheimer's cannot communicate and are completely dependent on others for their care. Near the end of life, the person may be in bed most or all the time as the body shuts down.



What causes Alzheimer's disease?

In recent years, scientists have made tremendous progress in better understanding Alzheimer's and the momentum continues to grow. Still, scientists don't yet fully understand what causes Alzheimer's disease in most people. The causes probably include a combination of age-related changes in the brain, along with genetic, environmental, and lifestyle factors. The importance of any one of these factors in increasing or decreasing the risk of developing Alzheimer's may differ from person to person

pathophysiology:

Amyloid- β Plaques: These are clusters of amyloid betas ($A\beta$) protein that accumulate outside neurons. $A\beta$ is a naturally occurring protein, but changes in its processing lead to aggregation and plaque formation. These plaques disrupt neuronal function and contribute to cognitive decline¹².

Neurofibrillary Tau Tangles (NFTs): NFTs are aggregates of misfolded tau protein within neurons. Tau normally stabilizes microtubules, but in Alzheimer's, it becomes hyperphosphorylated and forms tangles. These tangles impair neuronal transport and communication¹.

Neuronal Atrophy and Synapse Loss: Throughout the cerebral cortex, there is neuronal atrophy and a gradual loss of synapses. This primarily affects the hippocampus and cerebral cortex, leading to memory impairment and cognitive decline¹.

Inflammation and Oxidative Stress: Chronic inflammation and oxidative stress play a role in disease onset and progression. Microglia, the brain's immune cells, become activated and release pro-inflammatory molecules. Oxidative stress damages neurons and exacerbates neurodegeneration¹.

Mitochondrial Dysfunction: Impaired mitochondrial function affects energy production and contributes to neuronal degeneration. Mitochondria play a crucial role in maintaining neuronal health¹.

Protein Clearance Mechanisms: Dysregulation of protein clearance pathways, such as autophagy and the ubiquitin-proteasome system, leads to the accumulation of toxic protein aggregates. These impair cellular homeostasis and contribute to disease progression

Drug:

Donepezil (Aricept®): Approved to treat all stages of Alzheimer's disease. It helps improve cognitive function and memory by increasing the levels of acetylcholine in the brain¹.

Rivastigmine (Exelon®): Approved for mild-to-moderate Alzheimer's and also for mild-to-moderate dementia associated with Parkinson's disease. It works similarly to donepezil by inhibiting the breakdown of acetylcholine¹.

Galantamine (Razadyne®): Approved for mild-to-moderate stages of Alzheimer's. Like the other drugs, it enhances acetylcholine levels in the brain, providing symptomatic relief¹.

Remember to consult a healthcare professional before starting any medication. Additionally, creating a supportive environment, staying physically active, and maintaining a healthy lifestyle can also contribute to managing Alzheimer's symptoms effectively². If you or someone you know is experiencing symptoms of Alzheimer's, seek medical attention promptly.

Reference:

1. De-Paula V.J., Radanovich M., Diniz B.S., Forlenza O.V. Alzheimer's disease. Sub-Cell. BioChem. 2012; 65:329–352. Doi: 10.1007/978-94-007-5416-4_14. [PubMed] [Crossref] [Google Scholar]